



I. Purpose

This newsletter provides the minimum special inspection standards for smoke control systems. The special inspector is responsible for the inspecting, testing, and reporting requirements outlined herein.

II. Scope

This newsletter applies to California Building Code (CBC), Chapter 9, smoke control systems and CBC Chapter 10, pressurized stairs.

III. Definition

Design Pressure - the *maximum* pressure the fan will impose on a duct under the conditions of *minimum* flow as called for by the sequence of operations and the system control capabilities. This pressure will be positive for smoke control 'supply' ducts and negative for smoke control 'exhaust' ducts.

IV. Inspection Requirements

A. Automatic Dampers: Verify that automatic smoke control dampers are listed and that they conform to the requirements of approved recognized standards. (CBC Section 905.7.5)

B. Control Air Tubing:

1. Verify material for tubing and fittings is in conformance with CBC 905.10.2. Verify connection requirements are in compliance with CBC 905.10.2. Verify tubing is in accordance with the approved control diagram.
2. Verify that automatic isolation valves separate all control tubing serving other than smoke control functions. (CBC 905.10.3)
3. Verify that all tubing has been flushed clean and dried prior to final connections. This function may be done by the contractor and verified by the special inspector. (CBC 905.10.1)

C. Control Diagrams: Verify location of all fire alarm initiating devices indicated on control diagrams. Verify location of all output devices (dampers, fans, automatic doors, conductor, junction points) indicated on control diagrams. Verify that fire alarm initiating devices which activate smoke control are properly zoned in accordance with the respective smoke control zone. This includes automatic sprinkler systems when applicable. (CBC 905.12 and 905.15.8)

D. Fan Belts: Verify that belt-driven fans have at least 1.5 times the number of belts required for the

design duty with the minimum number of belts being two. (CBC 905.7.6)

E. Marking and Identification: Verify that the detection and control systems are clearly marked at all junctions accesses and terminations. (CBC 905.11)

F. Wiring:

1. Verify that all smoke control detection and control wiring is in continuous raceways. (CBC 905.9.2)
2. Verify that the standby power source and its transfer switches are located in a separate room from the normal power transformers and switchgear. Verify that the power distribution from normal and standby sources are independent routes. (CBC 905.8.1)

V. Testing Requirements

A. Control Action and Priorities:

1. Verify that the firefighter's control panel has priority over other building systems (e.g., energy management control systems and automatic temperature control). (CBC 905.13.3)
2. Verify that the firefighter's control panel functions in accordance with its design intent and the approved drawings. (CBC 905.13)
3. Verify that doors, fans, and dampers are configured properly and that the appropriate status indication light is lit on the firefighter's control panel.

B. Control Air Tubing: Verify that all control air tubing has been pressurized to three times operating pressure for not less than 30 minutes without any noticeable loss in gage pressure prior to final connection to devices. (CBC 905.10.4)

C. Controls:

1. Verify that each smoke zone has been put into operation by the actuation of one automatic initiation device. Verify that each additional such device within the zone (this includes sprinkler zones) has been verified to cause the same sequence, but the operation of fan motors may be bypassed after the first few positive trials to prevent damage. (CBC 905.15.8)
2. Verify the supervision of: the positive confirmation of actuation, testing of devices, manual override mechanisms, and presence of power downstream of all disconnects. (CBC 905.9.1)

3. Verify control sequences throughout the system, including verification of override from the firefighter's control panel. (CBC 905.15.8)
4. Simulation of standby power conditions and verification of smoke control system operations from the firefighter's control panel. (CBC 905.15.8) Simulation of standby power condition shall be performed while the smoke control system is operating.
5. Verify that all elements that rely on volatile memories (or the like) have uninterruptible power sources sufficient to span 15 minutes of primary power interruption. (CBC 905.8.2)

D. Dampers:

1. Verify that dampers have been tested for function in their installed condition. (CBC 905.15.4)
2. Verify that all smoke control system dampers are provided with stand by power.

E. Detection Devices: Smoke or fire detectors which are a part of a smoke control system will be tested in accordance with the Fire Code by the Contractor(s) in their installed condition. Field verification for compliance with all aspects of CBC 905.15 will be performed by the special inspector. When testing duct type smoke detectors, both minimum and maximum airflow is required. (CBC 905.15.2)

F. Ducts and Dry Wall Shafts:

1. During various stages of construction, verify pressure testing to 1.5 times the design pressure in accordance with nationally accepted practices. Perform/verify that measured leakage does not exceed 5 percent of design flow. (CBC 905.7.3)
2. Perform/verify that ducts which are part of a smoke control system have been traversed using accepted practices to determine actual air quantities. (CBC 905.15.3)

G. Fans:

1. Verify that motors driving fans do not operate beyond their name plate horsepower (kilowatts) as determined from measurement of actual current draw or KW meter. (CBC 905.7.6)
2. Examine fans for correct rotation. Verify measurements of voltage, amperage, revolutions per minute and belt tension have been made. (CBC 905.15.6)
3. Verify proper operation of air flow sensors. (CBC 905.9.1)

H. Inlets and Outlets: Perform/verify inlets and outlets have been read using generally accepted practices to determine air quantities and submit with final report. (CBC 905.15.5)

I. Pressurized Stairway Enclosures and Vestibules:

1. Perform/verify that the upper portion of stairway enclosures have been provided with controlled relief vent capable of discharging a minimum of 2500 CFM of air at the design pressure difference.
2. Perform/verify the minimum pressure differences within the vestibules. These are measured with the doors closed and are 0.05 inch water gage positive relative to the fire floor and 0.05 inch water gage negative relative to the stairway. (CBC 1005.3.3.7.1.4)
3. Verify that door opening forces are in compliance with CBC 1003.3.1.5.

J. Response Times: Perform/verify control and actuation response times.

1. Control air isolation valves: Immediately
2. Smoke damper closing: 15 seconds
3. Smoke damper opening: 15 seconds maximum
4. Fan starting (energizing): 15 seconds maximum
5. Fan stopping (de-energizing): Immediately
6. Fan volume modulation: 30 seconds maximum
7. Pressure control modulation: 15 seconds maximum
8. Temperature control safety override: Immediately
9. Positive indication status: 15 seconds maximum

Verify that the firefighter's control panel response time is the same for automatic and manual smoke control action initiated from any other building control point. (CBC 905.14)

K. Smoke Barriers: Perform/verify pressure difference measurements across smoke barriers using inclined manometers or other approved alternates. Conduct such measurements for each possible smoke control condition. Use portable fans to pressure test passive zones, use the CBC 905.2.3 leakage areas. Given a pressure difference of 0.05 inch water gage, the required CFM can be calculated. Provide this CFM (or less) within the smoke zone and measure the pressure difference across the smoke barrier. Verification of smoke barrier construction will be the Building Inspector's responsibility. (CBC 905.15.7)

The number/percentage of passive zones to be pressure tested will be documented on the permitted drawings by the Design Professional of Record. Calculations for all passive zones will be prepared by the Engineer of Record and supplied to the Air Balance Agency. Testing will be performed by a San Diego Planning and Development Review listed Air Balance Agency.

L. Standby Power:

1. Verify that full standby power is automatic within 60 seconds of primary power failure. (CBC 905.8.1) Test the transfer of normal to standby power while the smoke control system is operating.

VI. Recording Tests and Failed Tests or Inspections

The special inspector shall date specific tests and/or inspections and place them in the final report. The special inspector shall advise the Building Official of the proposed inspection and testing schedule. The special inspector shall provide the appropriate documentation to the Building Official in the event the contractor has not corrected the failing test or inspection. Should the contractor not correct the areas failing the test or inspection, a correction notice

or notice of violation will be given to the appropriate contractor. Re-testing or inspection shall be rescheduled as soon as possible.

VII. Final Reports

The final report shall be in accordance with CBC Section 905.15.9. The report shall be filed with both the Building Official and Fire Chief. An identical copy shall be maintained in the central control station or other approved location at the building.

This report shall have the signature of the approved inspector. The flow and pressure testing professional shall sign and also affix his/her AABC or NEBB agency stamp. The report shall also have the signature and stamp of the Design Professional of Record. The facility can not be granted a certificate of occupancy until this information is received.